Rocks and Minerals

I. Minerals

A. **A mineral is** _____

_____

_____

1. naturally occurring:
   a. minerals - _____
   b. not minerals - _____
2. inorganic: _____

   _____
   a. _____ is NOT a mineral because it comes from _____
   b. _____ is NOT a mineral because it comes from _____
   c. _____ is NOT a mineral because it comes from _____
3. Definite chemical composition:

Name of Mineral	Chemical Formula	Chemical Name	Elements and No.atoms/Molecule

4. solids – have a definite _____ and a definite _____.

_____ is NOT a mineral because it is a _____

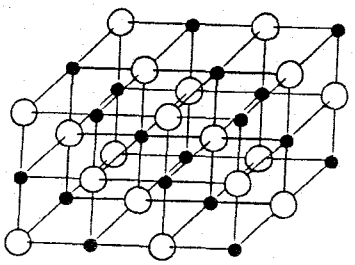
5. Crystal Structure:

_____

_____

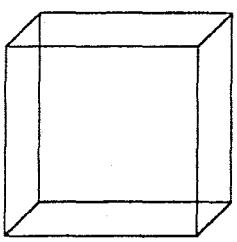
_____

_____



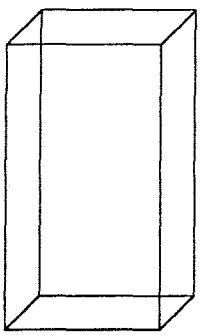
The six basic crystal systems:

CUBIC or ISOMETRIC



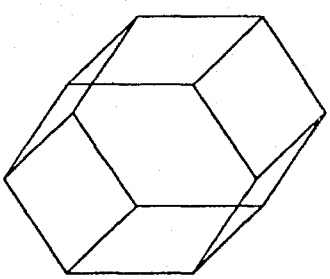
Galena, Halite, Pyrite

TETRAGONAL



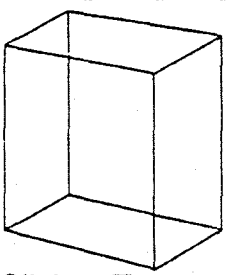
Chalcopyrite

HEXAGONAL



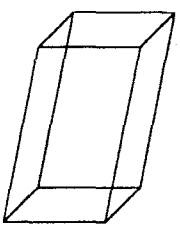
Quartz, Calcite

ORTHORHOMBIC



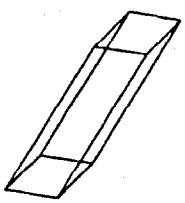
Olivine. Topaz

MONOCLINIC



Mica, Gypsum

TRICLINIC



Feldspar, Turquoise

B. Formation of Minerals-

1. _____

_____

2. _____

_____

_____

_____

II. **Identifying Minerals** – minerals can be identified by their _____ and/or _____ properties.

A. Physical Properties

1. Color-

a. Some minerals have only one color:

(1) malachite - _____

(2) sulfur - _____

b. Other minerals have many colors:

(1) quartz - _____

_____

(2) hematite - _____

c. Color can vary as the result of:

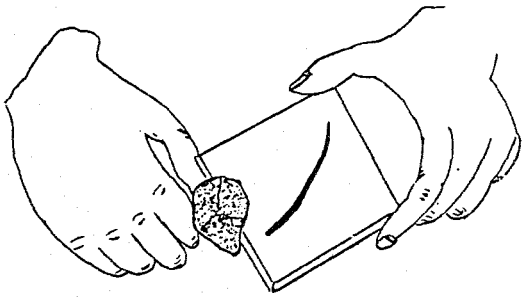
(1) _____

_____

(2) _____

_____

2. Streak- _____



_____

_____

_____

a. Hematite – Colors: dark red
reddish brown
gray
black

Streak: _____

b. Quartz - Colors: colorless
variety of colors

Streak: _____

3. Luster- _____

_____

a. _____ - _____

_____

examples:_____

b. _____ - _____

(1) _____ - _____

(2) _____ - _____

(3) _____ - _____

(4) _____ - _____

(5) _____ - _____

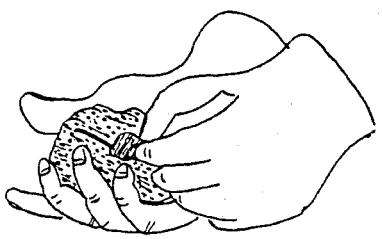
4. Hardness - _____

a. Softest mineral - _____

b. Hardest mineral - _____

c. Moh's Hardness Scale

NUMBER	NAME OF MINERAL
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

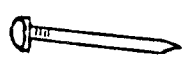


HARDNESS OF COMMON OBJECTS

2.5 _____

3.5 _____

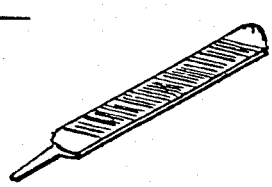
4.5 _____



5.5 _____

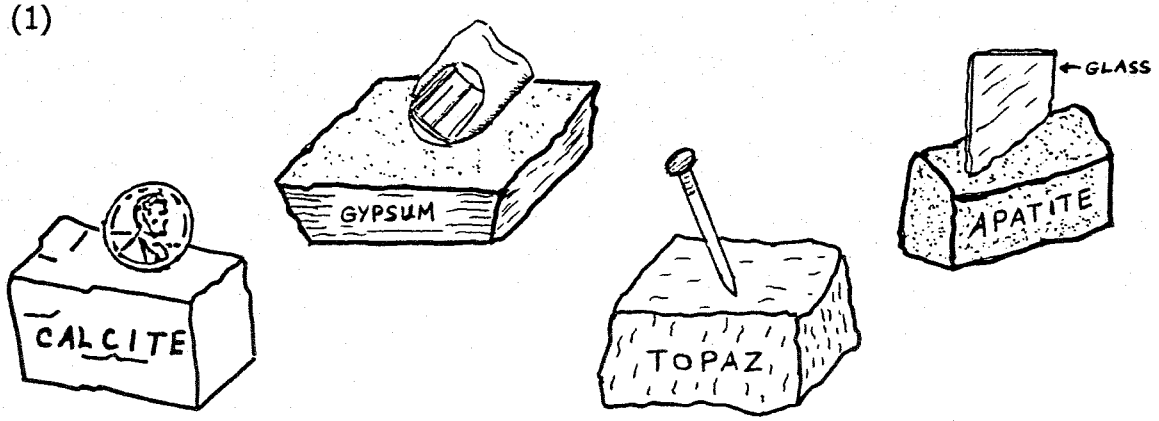
6.5 _____

7 _____



d. Testing Hardness

(1)



_____ _____ _____ _____

(2) (a) Will the mineral fluorite, hardness _____, be scratched by:

a piece of glass? _____

your fingernail? _____

an iron nail? _____

(b) Will the mineral quartz, hardness _____, be scratched by:

a piece of glass? _____

a copper penny? _____

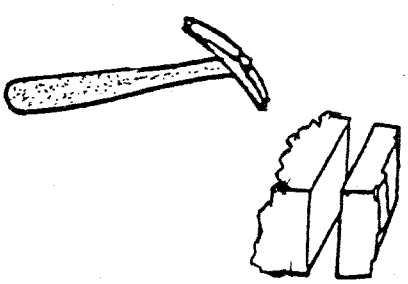
a steel file? _____

e. What determines Hardness? - _____

_____

_____

5. Cleavage and Fracture –



a. Cleavage - _____

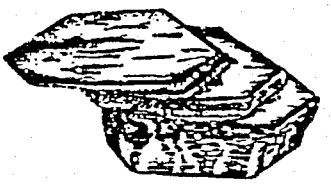
_____

_____

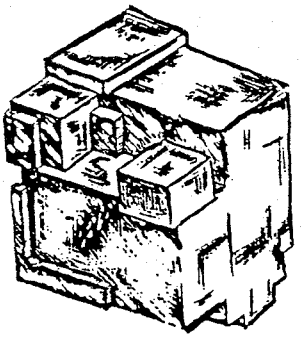
_____

(1) examples of cleavage:

(a)The mineral mica cleaves in _____ direction(s).



(b)The mineral galena cleaves in _____ direction(s).



(2) What determines cleavage?

_____

_____

_____

(3) Cleavage should NOT be confused with crystal shape. Cleavage is a property of the way a mineral _____, while crystal shape is a property of the way a mineral _____. When minerals have plenty of space to grow, they form _____.

b. Fracture - _____

_____

_____

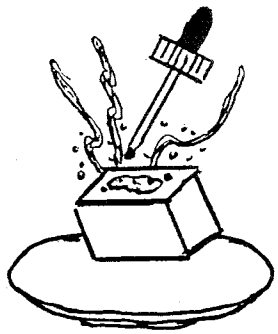
_____

(1) examples of minerals that show fracture:

_____

6. **Density or Heft –** due to the kinds of atoms a mineral contains, and how closely packed the atoms are, different mineral samples of the same size have different densities and feel heavier or lighter when lifted (or measured). A piece of gold has _____times as much mass as a piece of halite that is the same size.

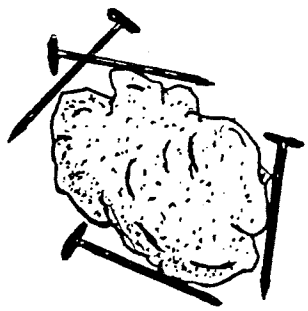
B. Chemical Properties



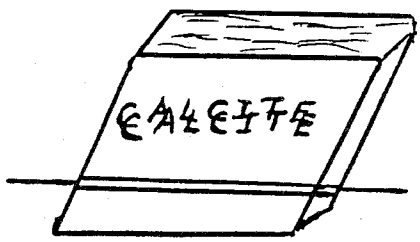
_____reacts with hydrochloric acid. It forms bubbles of carbon dioxide gas.

$CaCO_3 + 2HI \quad CaCl_2 + H_2O + CO_2$

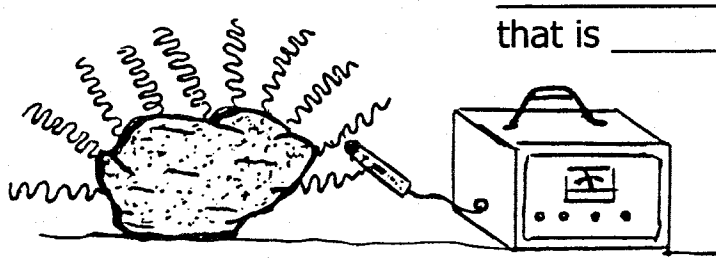
C. Special Properties –



Lodestone, a form of the mineral _____, is naturally _____



Iceland spar, a form of the mineral _____, produces _____.



_____ is an example of a mineral that is _____.

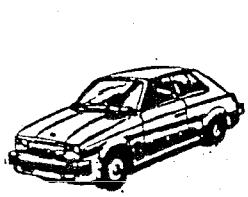
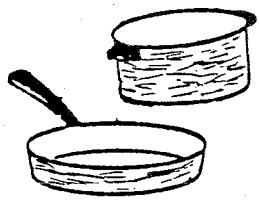
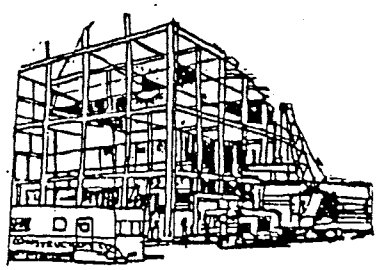
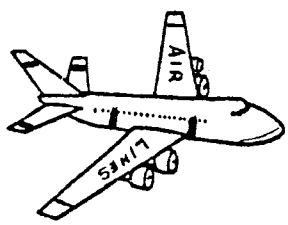
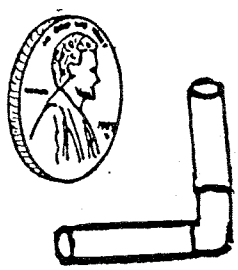
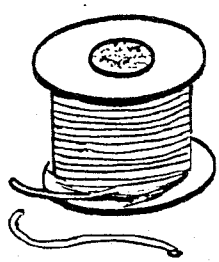
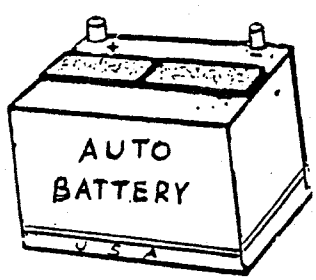
III. Uses of Minerals

A. Ore – a mineral that contains _____

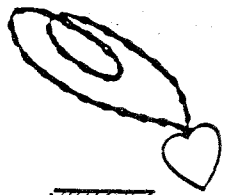
_____

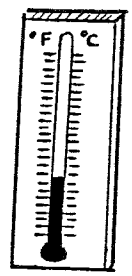
_____

1. Metals – elements that have shiny surfaces and are able to conduct _____ and _____
   a. examples

	METAL	MINERAL(S)	USE
1.	_____		 
2.	_____		 
3.	_____		 
4.	_____		  

METAL	MINERAL(S)	USE
5. _____		
6. _____		
7. _____		



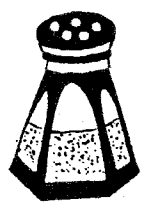


b. _____ - a mixture of two or more metals or a mixture of metals and nonmetals.

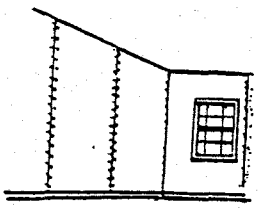
1. tin + copper → _____
2. copper + zinc → _____
3. iron + chromium + limestone → _____
4. lead + tin → _____

2. Nonmetals – elements that have dull surfaces and are poor conductors of _____ and _____.

	MINERAL(S)	USE
a.		

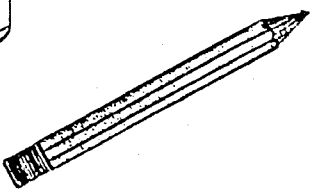


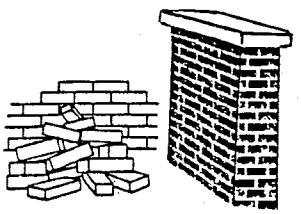
MINERAL(S) USE

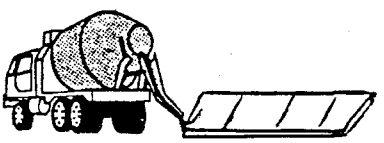
b. 

c. 

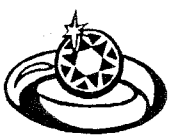
d. 

e. 

f. 

g. 

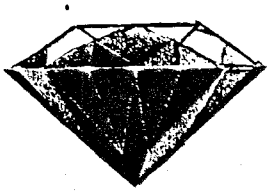
B. GEMS – minerals that have the following desirable qualities:



_____

_____

_____



1. precious stones - _____
2. semiprecious stones - _____
3. gems that are NOT minerals - _____

_____ - the branch of science that studies rocks.

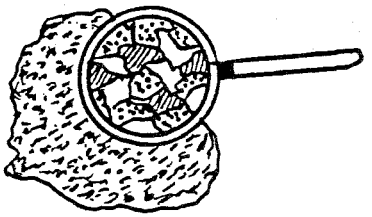
I. CLASSIFICATION OF ROCKS

A. Rocks are _____ on the basis of their

_____

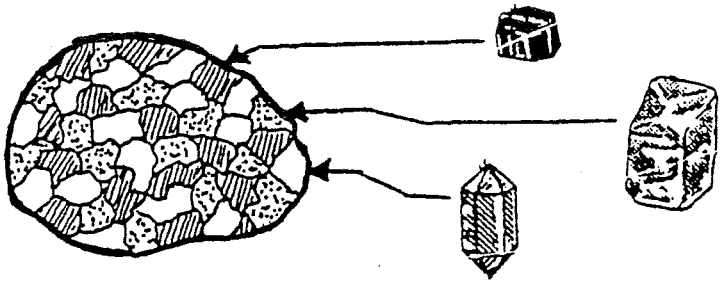
B. The three groups of rocks are:

1. _____
2. _____
3. _____



II. ROCKS IN RELATION TO MINERALS

A. Many kinds of rocks are composed of _____



B. Some rocks are _____ - composed of

_____

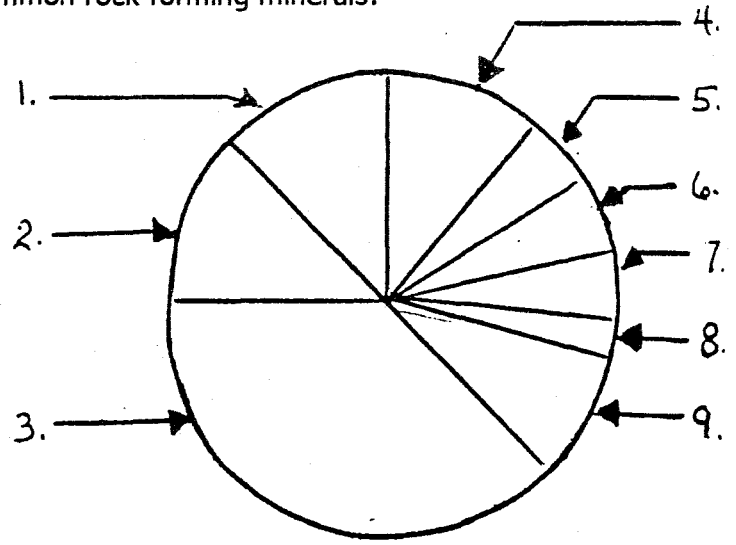
C. Most rocks are _____- composed of

_____

D. LETTERS:WORDS::MINERALS:ROCKS

E. There are almost _____types of minerals, but only _____ of these minerals (mineral families) make-up _____% of the rocks of Earth's crust.

F. Common rock-forming minerals:



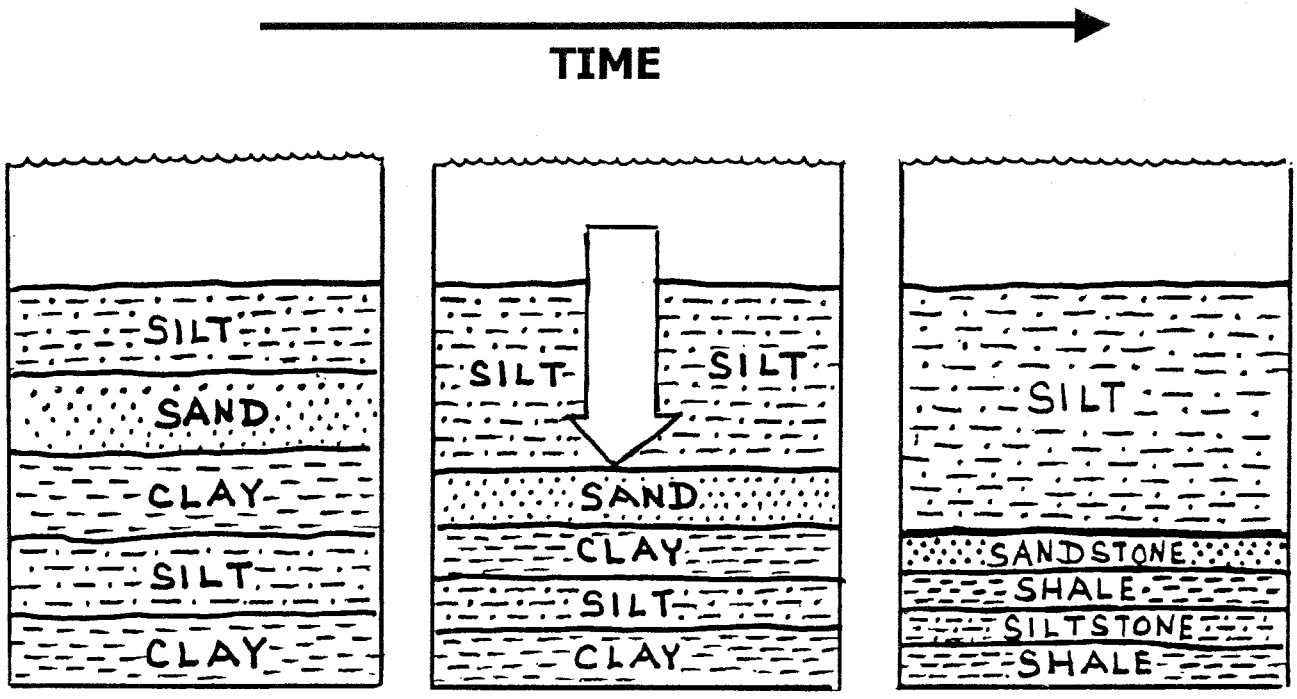
III. SEDIMENTARY ROCKS

A. _____

_____

_____

1. Most sedimentary rocks are made-up of solid sediments that have been weathered from other rocks. The weathered sediments are then eroded (transported) b water, wind, and moving ice. Eventually the eroded sediments are deposited at new locations either in water or on land. Most sedimentary rocks form in layers underwater in lakes, seas or oceans.
2. From sediments to rocks:



B. Types of Sedimentary Rocks

1. _____ - _____

_____

_____

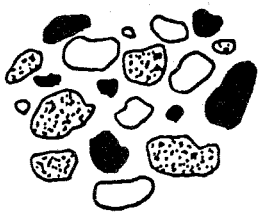
a. _____

b. _____

individual particles of rock – sediment

pressure

natural sediments dissolved in water



c.

ROCK NAME	GRAIN SIZE (CM)	COMMENT	MAP SYMBOL
		Various size rock Particles and mud Silt and sand cemented together	
		Fine to coarse grains cemented together	
		very fine grained	
		compact, may split easily	

2. _____ - _____

_____

_____

_____

ROCK NAME	COMPOSITION	COMMENT	MAP SYMBOL
		Minerals dissolved in water precipitate out and forms as crystals on the sea floor Includes evaporites	
		Changed form of limestone	

3. _____ - _____

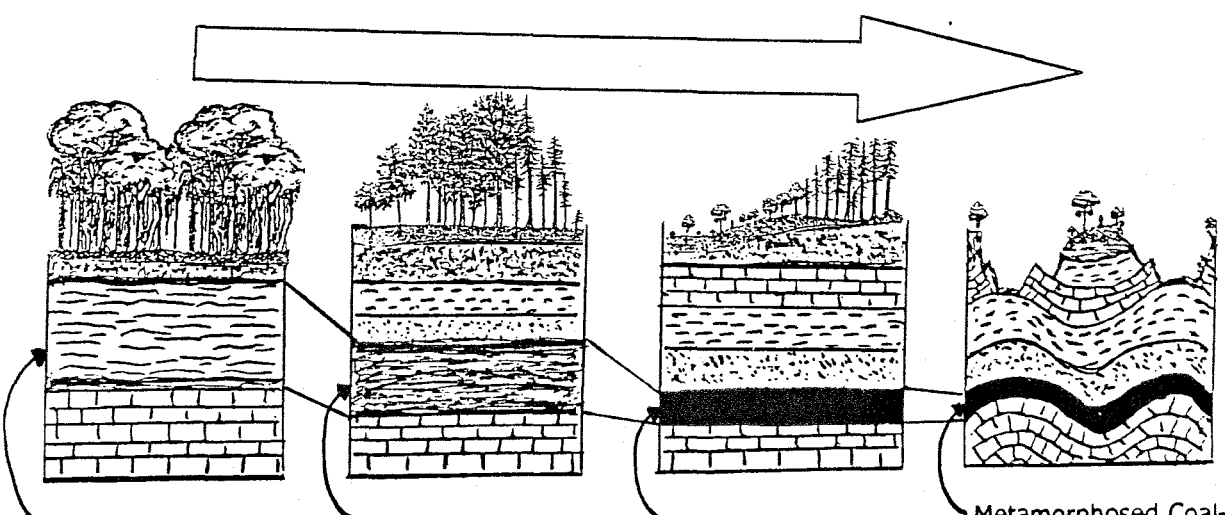
_____

_____

_____

ROCK NAME	COMPOSITION/COMMENT	MAP SYMBOL
	Cemented shell fragments	
	Carbon from plant remains	

Formation of Coal



_____-accumulated plant material

known as _____

known as _____

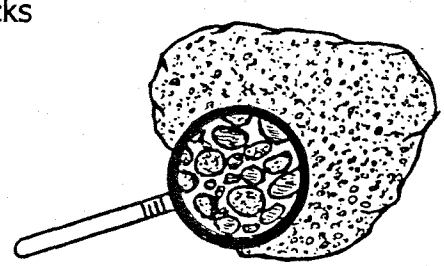
Metamorphosed Coal-

_____

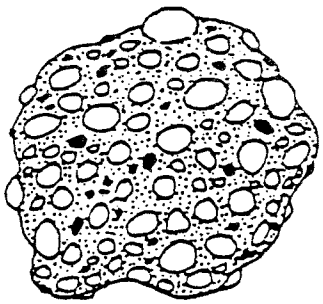
known as _____

C. Important characteristics of sedimentary rocks

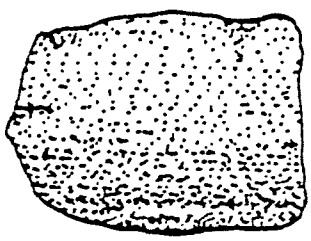
1. They are composed of rock fragments or organic particles.



a. Some have a range of particle or sediment size

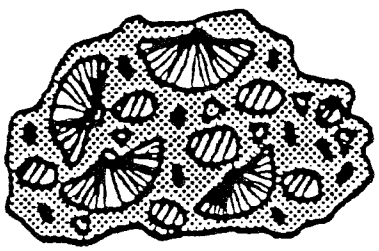


b. Others consist mainly of one size of sediments – due to sorting during deposition



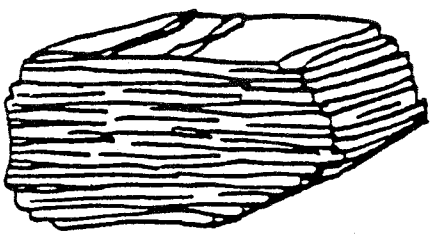
2. Some are organic – they form from plant and animal remains

_____



3. _____

_____



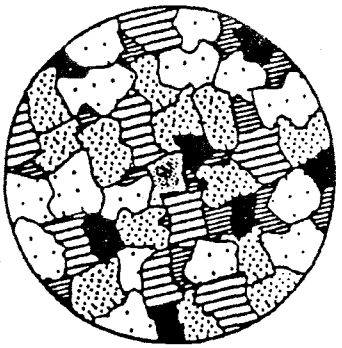
IV. IGNEOUS ROCKS

A. _____

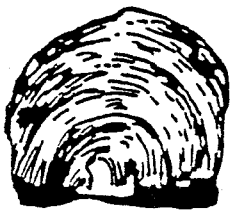
_____

_____

1. When molten(liquid) lava or magma _____ and _____, crystals of different minerals form the rock.
   a. The rock contains a crystalline structure of intergrown crystals of different _____, _____ and _____
   b.



B. Types of Igneous Rocks



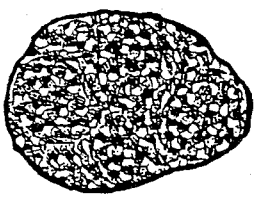
1. _____ -

_____

_____

_____

_____



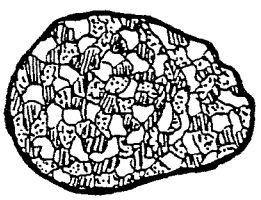
2. _____ -

_____

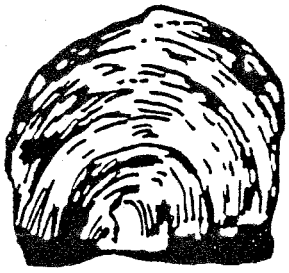
_____

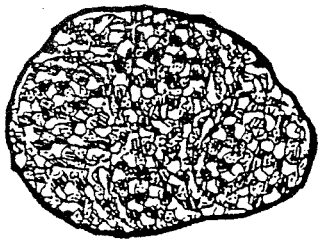
_____

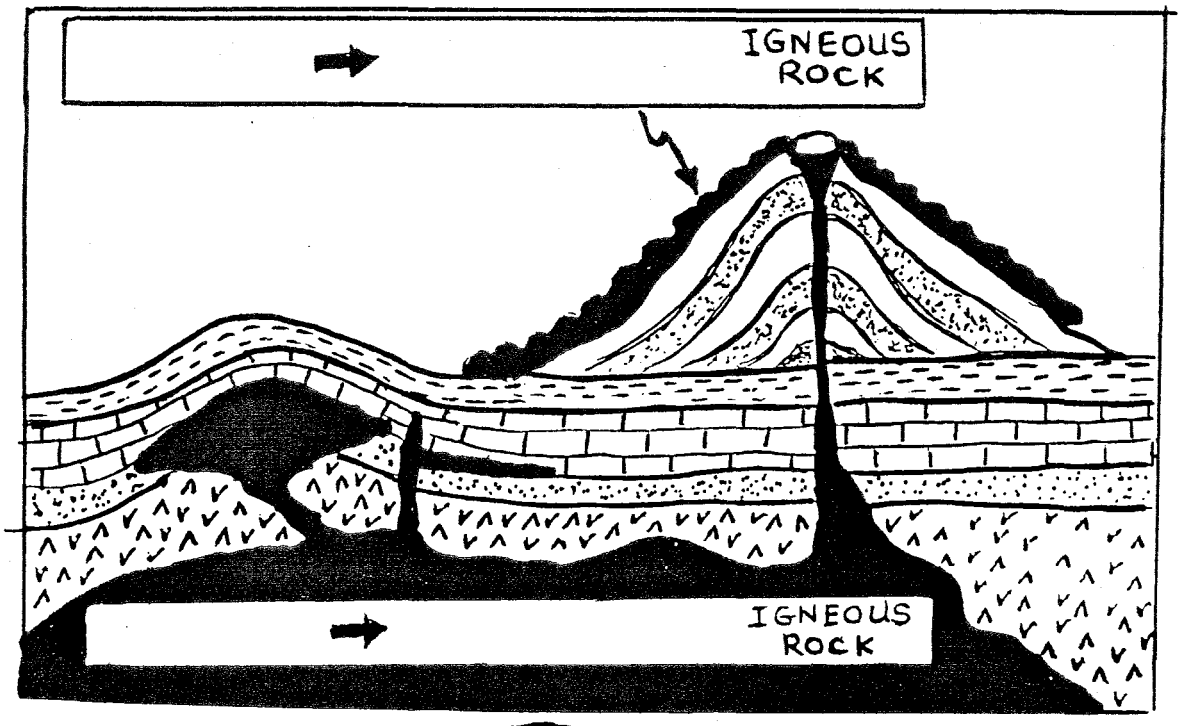
_____

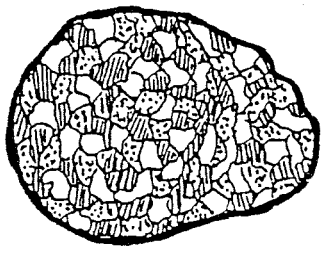


3.









4.

	ENVIRONMENT OF FORMATION		
	EXTRUSIVE (volcanic)		INTRUSIVE (plutonic)
RATE OF COOLING			
GRAIN SIZE			
TEXTURE			
EXAMPLES			

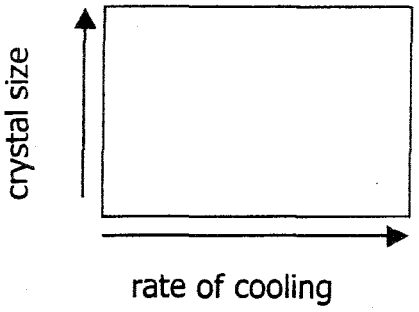
5. Relationship between _____ and _____

_____(the environment effects the cooling rate)

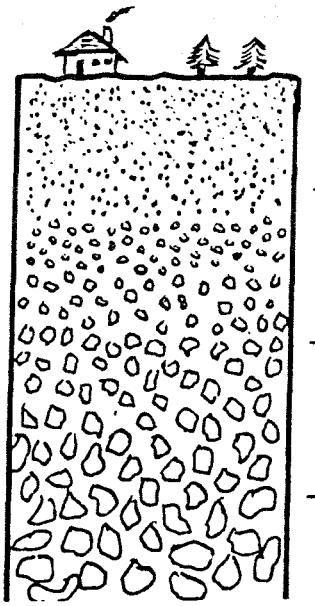
a. _____

_____

b.



c.



_____ crystals _____ cooling

_____ crystals _____ cooling

_____ crystals _____ cooling

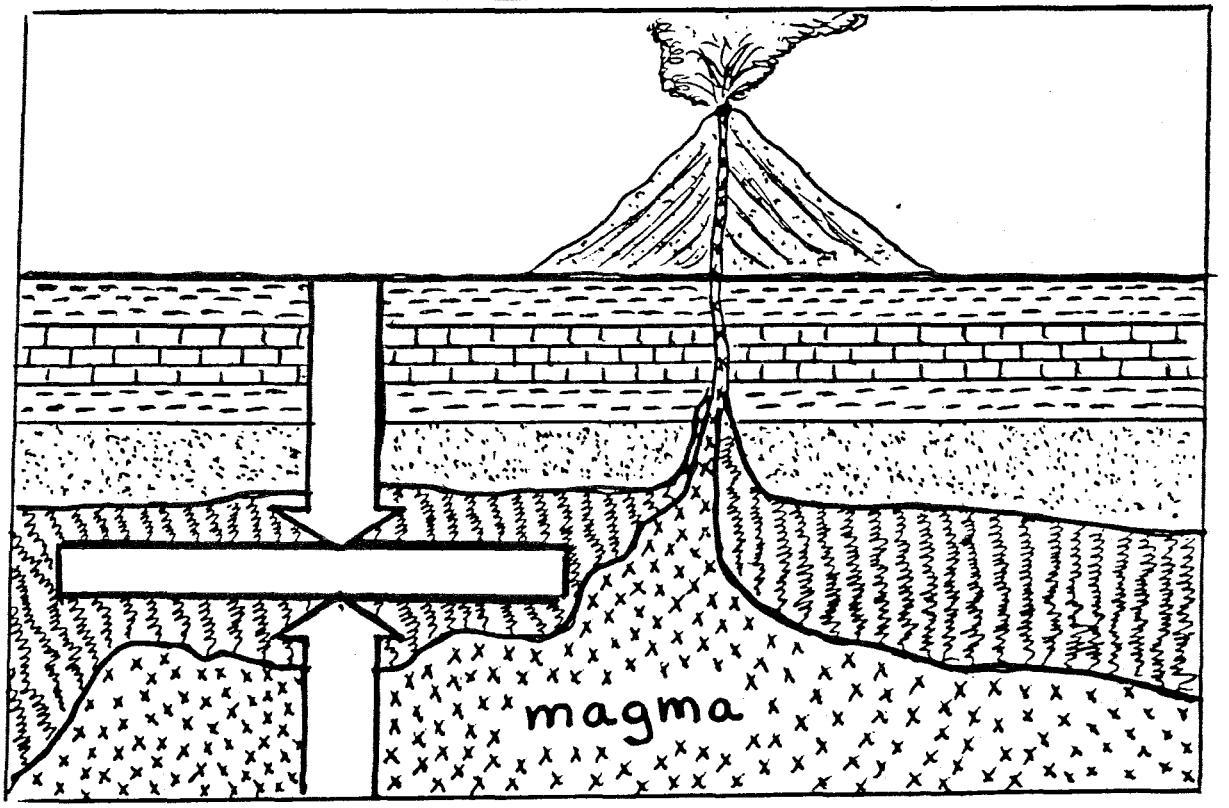
V. METAMORPHIC ROCKS

A. _____

_____

_____

B.



C. Conditions that cause rocks to undergo metamorphism include:

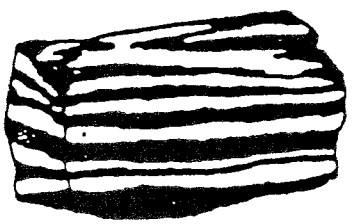
1. _____
2. _____
3. _____

Such conditions are often associated with deep burial and pressure that result from mountain formation. Therefore, metamorphic rocks are often found in mountainous regions where weathering and erosion have exposed this rock that was once deeply buried.

Under conditions of high temperature and high pressure, many metamorphic rocks form by the process of _____. This is the growth of new mineral crystals from the sediments of a _____ rock or the growth of new mineral crystals from the crystals of an _____ or _____rock. Recrystallization occurs without true melting.

D. Changes in a rock caused by metamorphism:

1. _____
2. _____
3. _____- is a layered arrangement of firmly joined crystals of minerals; the minerals are aligned in layers or bands. These bands are formed when rock is subjected to extreme pressure and temperature. Usually, the greater the pressure and temperature, the thicker the bands.



4. _____ - is the curving and folding of the bands. These distortions of once horizontal bands are caused by great environmental pressure exerted on the rock from different directions.

E. Types of metamorphic rocks:

1. _____ - _____

_____

_____

2. _____ - _____

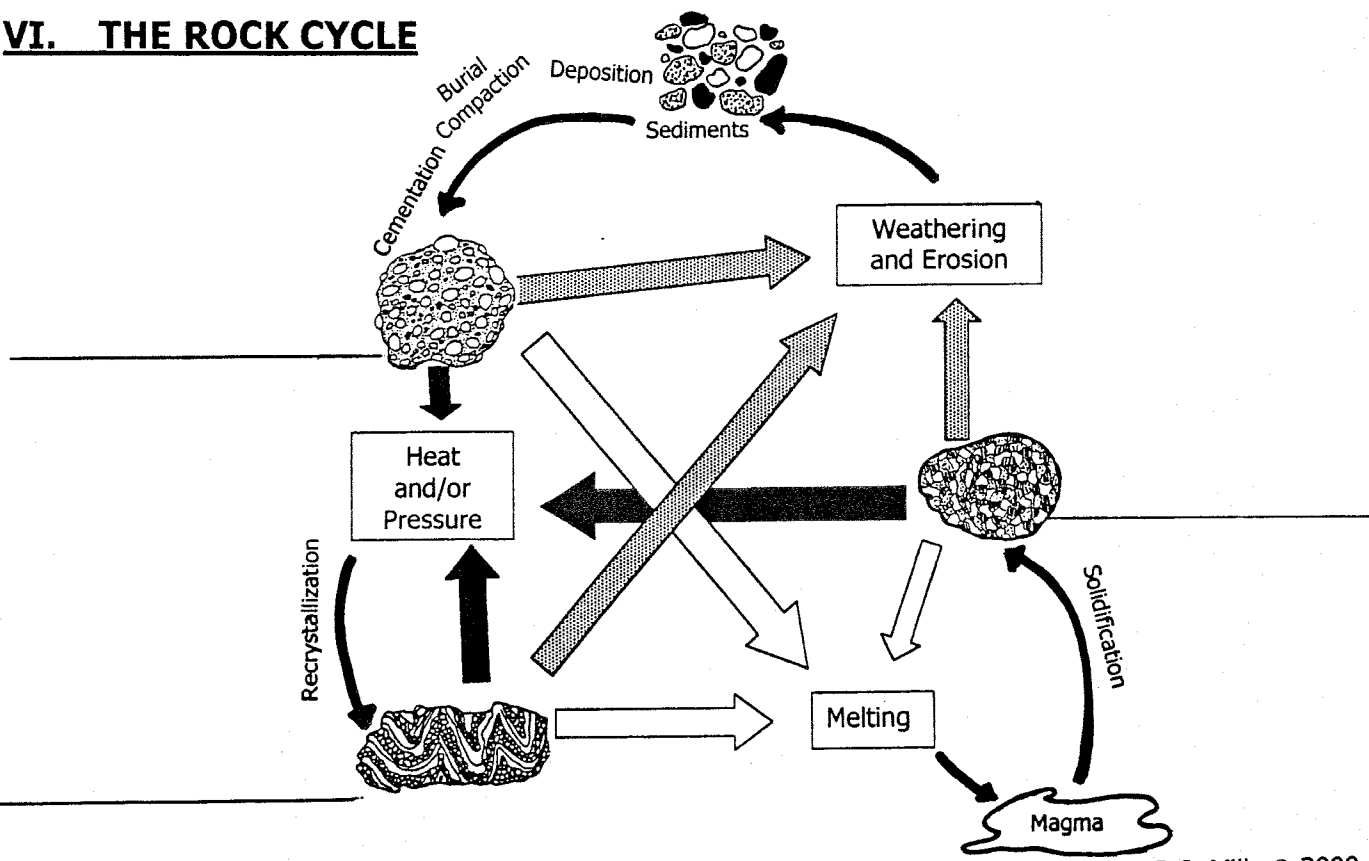
_____

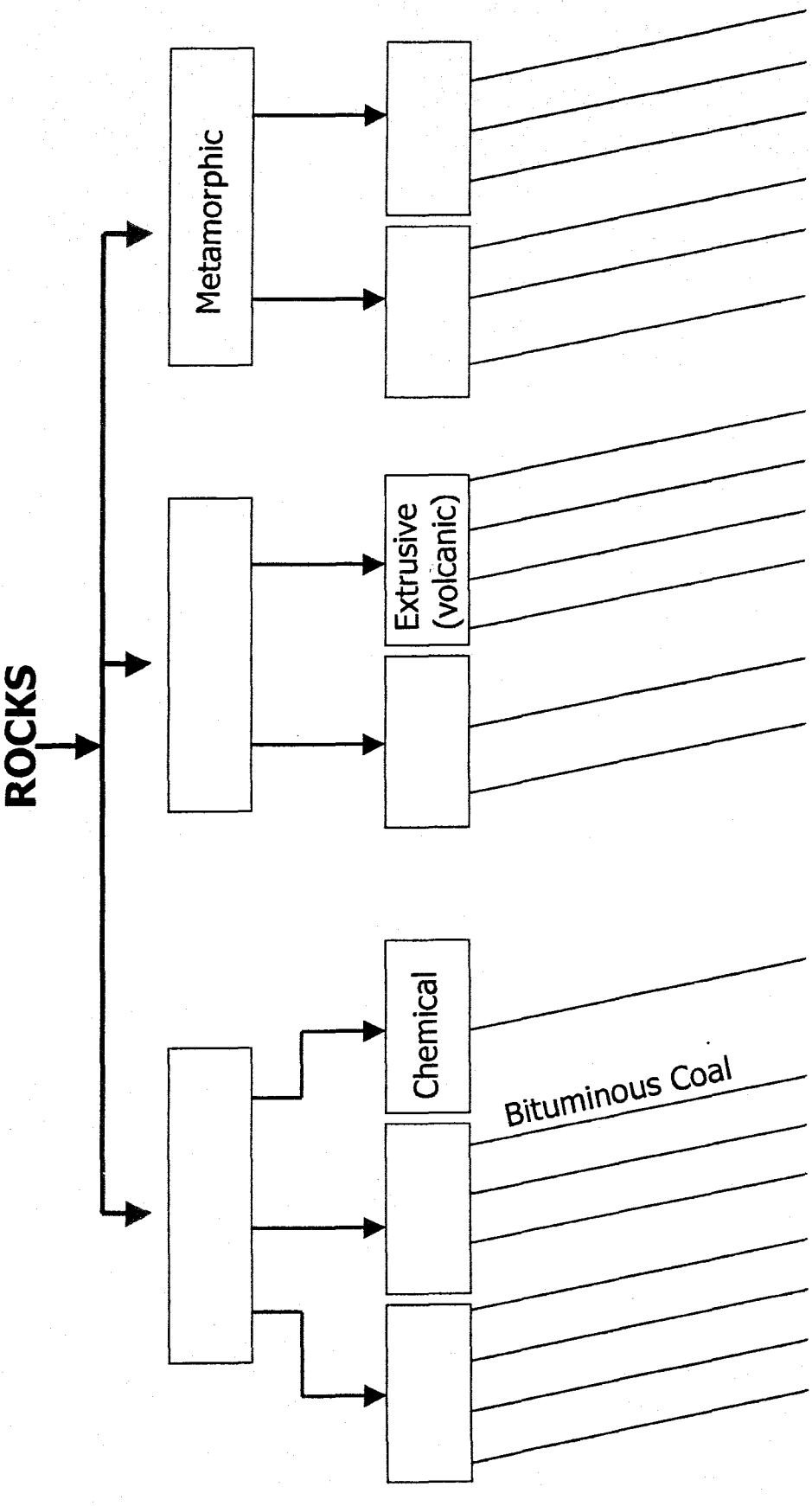
_____

F.

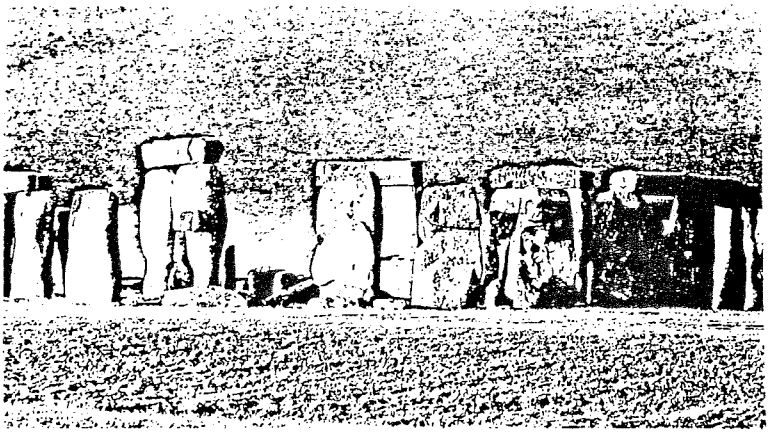
	METAMORPHIC ROCK		ORIGINAL ROCK	ORIGINAL TYPE
		←		
		←		
		←		
		←		
		←		
		←		

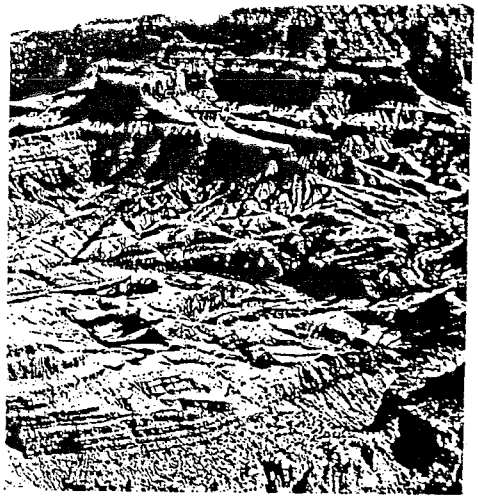
VI. THE ROCK CYCLE





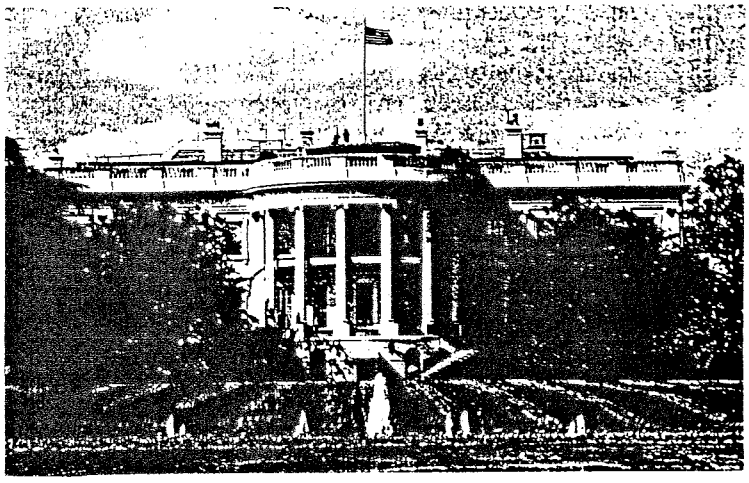
Famous Rocks





layers of sedimentary rocks

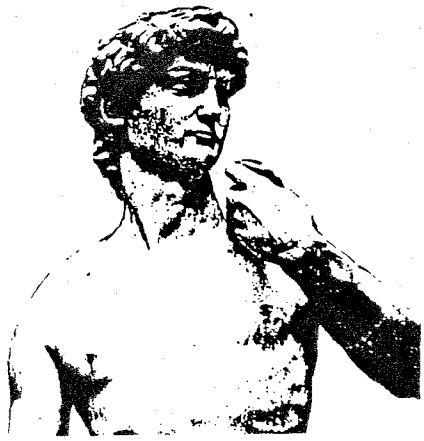
limestone

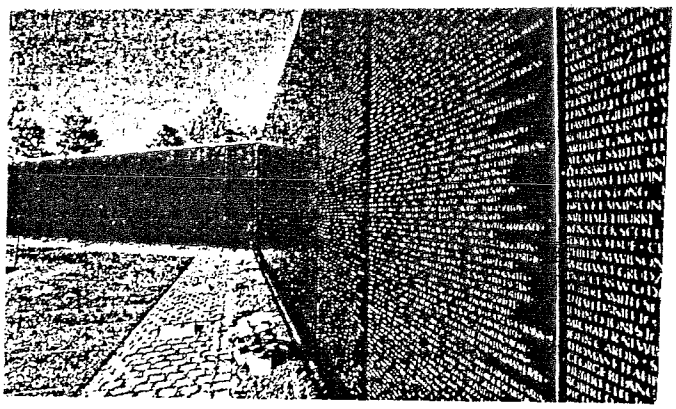


sandstone

Michelangelo's statue of ——————→

marble





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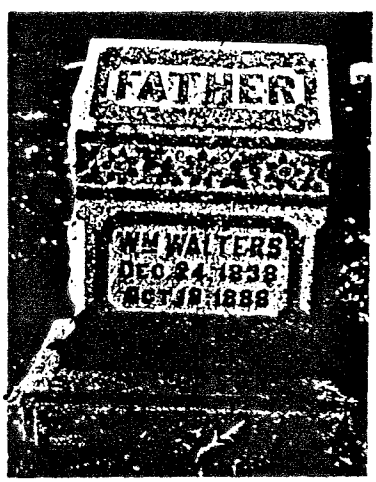
gabbro "black granite"



——————→

granite

←——————

marble